

REMARKS

1. Claim 16 has been amended to recite “a support having a surface area of at least 500 m²/kg and less than 5000 m²/kg” and “the ratio of Q_{HIA} to Q_K is in the range of from 1:1 to 5:1.” Claim 17 has been amended to recite “the ratio of Q_{HIA} to Q_K is in the range of from 1.1:1 to 5:1.” New dependent claim 50 has been added and is based on page 9, lines 25-34 of the application text as filed. New dependent claim 51 has been added and is based on page 4, lines 30-33 of the application text as filed. Claims 1-15 and 24-45 have been canceled. Applicants reserve the right to file divisional applications or take such other action as deemed necessary with respect to the canceled claims.

2. Claims 16-23 and 46-49 were rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,504,053 to Chou et al (hereinafter “Chou et al.”). Applicants adhere to the remarks/arguments made in the prior Response, dated January 16, 2007, and those remarks/arguments are hereby incorporated by reference. The following paragraphs are intended to further elaborate on the remarks/arguments already given.

For a prior art reference to anticipate a set of claims, each limitation of the claims must be disclosed in that reference. See M.P.E.P. 2131. Further, “[t]he identical invention must be shown in as complete detail as is contained in the ... claim.” See M.P.E.P. 2131 quoting *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989). In *Atofina v. Great Lakes Chemical Corporation*, the Federal Circuit held that a broad temperature range disclosed in the prior art did not disclose the claimed narrow range with sufficient specificity to anticipate the claim. 441 F.3d 999, 991 (Fed. Cir. 2006). The court stated: “The disclosure is only that of a range, not a specific temperature in that range....” *Id.* at 1000.

Applicants claimed process for preparing a catalyst composition in the present application relates to selecting a support having a surface area of at least 500 m²/kg and less than 5000 m²/kg, and depositing on the support:

silver metal,

a metal or component comprising rhenium, tungsten, molybdenum or a nitrate- or nitrite-forming compound, and

a Group IA metal or component comprising a Group IA metal having an atomic number of at least 37, and in addition potassium, wherein

the value of the expression of (Q_K/R) + Q_{HIA} is in the range of from 1.5 to 30 mmole/kg, wherein Q_{HIA} and Q_K represent the quantities in mmole/kg of the Group IA metal

having an atomic number of at least 37 and potassium, respectively, present in the catalyst composition,

the ratio of Q_{HIA} to Q_K is in the range of from 1:1 to 5:1,

the value of Q_K is at least 0.01 mmole/kg, and

R is a dimensionless number in the range of from 1.5 to 5.

Chou et al. describes alpha alumina-containing supports having a surface area of from about 0.03 m²/g to about 10 m²/g, preferably from about 0.05 to about 5, more preferably from about 0.1 to about 3 m²/g. *U.S. Patent No. 5,504,053*, col 14, ll. 8-12. Chou et al. at column 15, line 16 through column 18, line 18 describe catalysts for use in the invention containing one or more other promoters in addition to a manganese component. In particular, Chou et al. disclose catalysts which may contain cationic promoters (e.g., alkali metal and/or alkaline earth metals such as lithium, sodium, potassium, rubidium, cesium, beryllium, magnesium, calcium, strontium and barium, as well as Group 3b metal ions including scandium, yttrium, lanthanum and the lanthanide series metals) and anion promoters (e.g., oxyanions of elements other than oxygen having a molecular weight of 5 to 83 of Groups 3b to 7b and 3a to 7a of the Periodic Table such as oxyanions of rhenium; oxyanions such as sulfate, phosphates, titanates, tantalates, molybdates, vanadates, chromates, zirconates, polyphosphates, nitrates, chlorates, borates, borates, silicates, carbonates, tungstates, thiosulfates, cerates and the like, halides such as fluoride, chloride, bromide and iodide). *Id.* at col. 9, ll. 4-22; col. 15, ll. 22-24; 30-40; col. 16, l. 32 to col. 17, l. 21. The preferred amount of cation promoter deposited on or present on the surface of the carrier or catalyst is between about 10 to about 4000, preferably about 15 and about 3000, more preferably about 20 and about 2500, most preferably about 50 and about 2000 ppmw of cation calculated on the total carrier material. *Id.* at col. 15, l. 66 to col. 16, l. 6.

In an embodiment, the catalyst contains a rhenium component in the form of a cation or an anion. When rhenium is used, it is provided in an amount of at least about 1, at least about 5, e.g., about 10 to 2000, often between 20 and 1000, ppmw calculated as weight of rhenium based on the total weight of the catalyst. *Id.* at col. 9, ll. 23-25; col 17. ll. 33-37.

In another embodiment, a redox pair catalyst is disclosed which may contain at least one efficiency-enhancing salt of a member of a redox-half reaction pair. In this embodiment, potassium is the preferred cation although sodium, rubidium and cesium may also be operable and the preferred anions are nitrate, nitrite and other anions capable of forming nitrate ions under epoxidation conditions. The most preferred salt of a member of a redox-half reaction

pair being potassium nitrate. *Id.* at col. 9, ll. 26-33; col. 17, l. 38 to col. 18, l. 3. In this embodiment, the amount of efficiency-enhancing salt is about 0.01 to about 5 percent (based on the amount of cation relative to the total weight of the catalyst), preferably about 0.02 to about 3 percent, most preferably about 0.03 to about 2 percent. *Id.* at col. 18, ll. 13-18.

In another embodiment, the redox pair catalyst contains an alkali metal nitrate, especially potassium nitrate and/or rubidium nitrate. This catalyst may be used with a nitrogen and oxygen-containing compound (defined as gaseous efficiency-enhancing members of redox-half reaction pairs) in the reaction zone. Rubidium may be provided in amounts greater than about 400 to 500 ppmw based on weight of potassium. *Id.* at col. 9, ll. 34-44; col. 21, ll. 50-53.

Especially when using other than a redox pair catalyst, Chou et al. disclose that the catalyst should have an amount of acid leachable potassium of less than about 50, preferably less than about 25, e.g., 0 to 25 ppmw, based on the weight of the catalyst. *Id.* at col. 9, ll. 45-49; col. 16, ll. 16-24.

The Examiner asserts that Chou et al. disclose the claimed process of the present invention, in particular "a process for preparing a catalyst composition comprising, selecting a support having a surface area of $0.03 \text{ m}^2/\text{g}$ ($10 \text{ m}^2/\text{kg}$) to about $10 \text{ m}^2/\text{g}$ ($10 \times 10^3 \text{ m}^2/\text{kg}$), and depositing on the support: silver metal, a metal or component comprising rhenium, tungsten, molybdenum, or a nitrate-or nitrite-forming compound, and a component containing a Group IA metal having an atomic number of at least 5 to 83, and in addition potassium. Chou et al. discloses anion promoters such as oxyanions of elements other than oxygen having a molecular weight of 5 to 83 of Groups 3b to 7b and 3a to 7a of the Periodic Table and not Group IA metals having an atomic number of at least 5 to 83. The possible cation promoters for catalysts other than redox pair catalysts include lithium, sodium, potassium, rubidium, cesium, beryllium, magnesium, calcium, strontium and barium, as well as Group 3b metal ions including scandium, yttrium, lanthanum and the lanthanide series metals. For the redox pair catalysts, in one embodiment, potassium is the preferred cation although sodium, rubidium and cesium may also be operable, and in another embodiment, the redox pair catalyst contains an alkali metal nitrate, especially potassium and/or rubidium nitrate. For all these embodiments, potassium is an optional cation promoter. Further, for catalysts other than redox pair catalysts, the amount of acid leachable potassium is taught to be less than 50, e.g., 0 to 25 ppmw, based on the weight of the catalyst. Additionally, the disclosure of an alkali metal in embodiments relating to a redox pair catalyst does not require the presence of

an alkali metal in catalysts other than redox pair catalysts. With respect to surface areas of the support, Chou et al. at column 14, lines 8-12 describes a broad range of surface areas (e.g., 0.03 to about 10 m²/g). These disclosures do not disclose the claimed combination of elements in claim 16 with sufficient detail or specificity to anticipate claim 16.

The Examiner points to column 15, line 63 to column 16, line 12 as disclosing the “(Q_K/R) + Q_{HIA}” limitation of claim 16. The Examiner further asserts that “Chou et al., further disclose that in said process for preparing a catalyst composition, preferably, cesium comprises at least about 10, more preferably, about 20 to 100 percent by weight of the total added alkali metal and alkaline earth metal (i.e., Group IA metals having an atomic number of at least 37, in this instant case) in the finished catalyst.” *See Office Action mailed April 6, 2007*, section 1, 2nd –4th paragraphs. The Examiner uses the disclosed ranges for the total amount of cation promoters to calculate that the amount of potassium present in the catalyst is between about 0.26 mmoles/kg and about 102.56 mmoles/kg, preferably about 0.38 and about 76.92 mmoles/kg, and more preferably about 0.51 and about 64.1 mmoles/kg and further states that the amount of cesium to other salt(s) is taught to be in a ratio of 0.001:1 to 1000:1. *Id.* at section 1, 5th paragraph.

The amount of cation promoters described at column 15 to column 16 are in relation to catalysts other than redox pair catalysts. As discussed above, the cation promoters may include many different cations not necessarily potassium, and the total amount of cation promoters may vary widely, for example between about 10 and about 4000 ppmw, based on the total carrier material. When cesium is used in the mixture with other cations, the ratio of cesium salt to any other alkali metal and alkaline earth metal salt(s), if used, may vary over a wide range. The ratio of cesium salt to other salt(s) may vary from about 0.0001:1 to 10,000:1, preferably 0.001:1 to 1000:1; preferably cesium comprises at least about 10, more preferably, about 20 to 100 percent by weight of total added alkali metal and alkaline earth metal in the finished catalyst. *Id.* at col. 16, ll. 6-15. This disclosure describes very broad ranges for the total amount of cation promoters and the amount of cesium relative to the weight of the total added alkali metal and alkaline earth metal, not specifically potassium. The Examiner errs in using the range of values for the total amount of cation promoters to calculate that the amount of potassium present in the catalyst is between about 0.26 and about 102.56 mmoles/kg and then using the disclosure of preferred cesium amounts to find the claim elements relating to Q_K and Q_{HIA} are anticipated. The total amount of cation promoters includes the amount of all cations not just potassium, and as discussed above, the preferred

ratios of cesium salt are in relation to total added alkali metal and alkaline earth metal. This disclosure of Chou et al. does not disclose the claim limitations of $(Q_K/R) + Q_{HIA}$ from 1.5 to 30 mmole/kg and the ratio of Q_{HIA} to Q_K of from 1:1 to 5:1 with sufficient detail or specificity to anticipate claim 16.

Further, for the redox pair catalysts, the amount of efficiency-enhancing salt may also vary over a wide range, in particular from about 0.01 to about 5 percent, calculated as the cation relative to the weight of the catalyst. This disclosure of Chou et al. does not disclose the claim limitations of $(Q_K/R) + Q_{HIA}$ from 1.5 to 30 mmole/kg and the ratio of Q_{HIA} to Q_K of from 1:1 to 5:1 with sufficient detail or specificity to anticipate claim 16.

In the Examiner's response to Applicants' arguments filed on January 16, 2007, the Examiner did not deem the arguments presented as persuasive because the claim limitations fall within the said range of the preferred amount of cation promoter disclosed by Chou et al. (i.e., between about 10 and about 4000 ppm) and because the preferred weight limitations regarding cesium salt to any other alkali metal and alkaline earth metals teach the limitation for the quantity of mmoles/kg of the Group IA metal having an atomic number of at least 37, wherein Q_{HIA} is at least 0.01 mmoles/kg. The Examiner also points to Chou et al. at column 9, lines 34-38, which discloses a preferred embodiment relating to a redox pair catalyst containing an alkali metal nitrate, especially potassium, and/or rubidium nitrate, especially in amounts greater than about 400 or 500 ppm by weight based on the weight of potassium, as teaching that the inclusion of any cation promoters other than alkali metals is optional for catalysts other than redox pair catalysts in the embodiment at column 9, lines 4-7.

The preferred weight limitations regarding cesium salt to any other alkali metal and alkaline earth metals does not disclose the claim limitation that the value of Q_K is at least 0.01 mmole/kg. Further, the alkali metal for catalysts other than redox pair reactions is optional as discussed hereinbefore. The embodiment regarding the redox pair catalysts containing potassium, and/or rubidium nitrate, especially in amounts greater than about 400 or 500 parts by weight (4.7 or 5.8 moles) of rubidium per 1,000,000 parts by weight (25,641 moles) of potassium discloses a broad range of rubidium in relation to the weight of potassium. This embodiment does not disclose the claim limitations of $(Q_K/R) + Q_{HIA}$ from 1.5 to 30 mmole/kg and the ratio of Q_{HIA} to Q_K of from 1:1 to 5:1 with sufficient detail or specificity to anticipate claim 16.


In light of the discussion above, Applicants respectfully request the rejection be withdrawn.

Further, as evidenced in Table I in the working examples of the application text, catalysts prepared in accordance with the invention demonstrate improved catalytic performance over catalysts not prepared in accordance with the invention. For example, Examples 3, 4 and 5, according to the invention, demonstrate improved long-term selectivity stability over Examples 1 and 2, not according to the invention.

Applicants respectfully request a timely Notice of Allowance be issued in this case. If the Examiner would like to discuss this case with Applicants attorney, the Examiner is invited to contact the undersigned at the phone number below. Should any fee be due in connection with the filing of this response, the Commissioner for Patents is hereby authorized to deduct said fee from Shell Oil Company, Deposit Account No. 19-1800.

Respectfully submitted,

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